

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): N. Moriwaki

Serial No.: 10/759,237

Filed: January 20, 2004

For: PACKET COMMUNICATION DEVICE

Art Unit: 2616

Examiner: Dewanda A. Samuel

AMENDMENT AFTER FINAL - EXPEDITED
PROCEDURE UNDER 37 CFR 1.116

MS AF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

August 9, 2008

Sir:

In response to the Office Action dated March 13, 2008, please amend
the above-identified application as follows.

Amendments to the Claims

Remarks are included following the amendments.

IN THE CLAIMS

This listing of the claims will replace all prior versions and listings of claims in the present application.

Listing of Claims

Claim 1 (canceled).

2. (currently amended) A packet communication device,

comprising:

a plurality of line interfaces capable of reception or transmission of a packet;

a plurality of ports to which said plurality of line interfaces are connected and to which at least one functional processor to be used to perform functional processing on an incoming packet received by any of said plurality of line interfaces can be connected as needed;

a function item judgment unit for judging a function item to be required for said incoming packet;

a forwarding information generator for determining a forwarding port for said incoming packet in accordance with said function item obtained from judging by said function item judgment unit and imparting to said incoming packet forwarding information for designating said forwarding port; and

a forwarding path switching unit for switching a forwarding path when forwarding said incoming packet among said plurality of ports based on said forwarding information~~The packet communication device according to Claim~~

4,

wherein when said function item judgment unit has judged that a plurality of functional ~~processing is~~processings are required for said incoming

packet, the plurality of forwarding information corresponding to functional processors capable of executing said required functional processings is imparted to said incoming packets at the forwarding information generator in order to forward said incoming packets successively to a plurality of ports to which the functional processors capable of executing said required functional processings are connected respectively.

3. (previously presented) The packet communication device according to Claim 2, wherein in order to forward those incoming packets which have been subjected to said plurality of functional processing to any of said plurality of line interfaces, said forwarding information generator further imparts, to said packet, forwarding information corresponding to a port, to which the said line interface is connected for forwarding said incoming packets.

4. (previously presented) The packet communication device according to Claim 2 or 3, further comprising:

a forwarding information eliminator for eliminating, after said incoming packet is forwarded to a predetermined port based on said forwarding information, forwarding information corresponding to said port from forwarding information added to said incoming packet.

5. (previously presented) The packet communication device according to Claim 2 or 3, wherein as said incoming packet is successively forwarded based on said forwarding information, said forwarding information

generator further imparts, to said incoming packet, subsequent forwarding information for designating in said forwarding information which information concerning the subsequent forwarding destination is, and

wherein said device further comprises:

a forwarding information renewal unit for renewing, after said incoming packet is forwarded to a port to be designated in said forwarding information and said subsequent forwarding information, said subsequent forwarding information.

6. (original) The packet communication device according to Claim 5, wherein said forwarding information and said subsequent forwarding information will be erased before said incoming packet is outputted to the outside from any of said plurality of line interfaces.

7. (currently amended) The packet communication device according to ~~any of Claims 1 to 6~~claim 1 to 6, wherein said functional judgment unit and said forwarding information generator are installed in at least one of said plurality of line interfaces.

8. (currently amended) The packet communication device according to ~~claim any of Claims 1 to 7~~claim 1 to 7, wherein at least one said functional processor is further provided with said functional judgment processor and said forwarding information generator.

9. (currently amended) A packet communication device,
comprising:

a plurality of line interfaces capable of reception or transmission of a packet;

one or a plurality of functional processors to be used ~~in order to~~ perform functional processing on an incoming packet received by any of said plurality of line interfaces;

a plurality of ports to which said plurality of line interfaces and said one or a plurality functional processors are connected;

a function item judgment unit for judging a function item to be required for said incoming packet;

a forwarding information generator for determining a forwarding port for said incoming packet in accordance with said function item obtained by judging by said function item judgment unit, and imparting to said incoming packet forwarding information for designating said forwarding port; and

a functional processor with a forwarding information generation function for performing functional processing on said incoming packet, determining, as a forwarding port, a port to which any of said plurality of line interfaces is connected based on a result of said functional processing, and imparting to said incoming packet forwarding information corresponding to said forwarding port,

when said function item judgment unit has judged that a plurality of functional processings are required for said incoming packet the plurality of forwarding information corresponding to functional processors capable of executing said required functional processings is imparted to said incoming

packet at the forwarding information generator in order to forward said incoming packet successively to a plurality of ports to which the functional processors capable of executing said required functional processings are connected respectively.

10. (currently amended) The packet communication device according to Claim 9, wherein said function item judgment unit and said forwarding information generator are incorporated in at least in one of said plural line interfaces, and

wherein when a forwarding port cannot be determined, said incoming packet is forwarded to a port to which ~~said a~~ functional processor with said forwarding information generation function is connected.

11. (previously presented) The packet communication device according to Claim 10, wherein when said incoming packet conforms to a first predetermined communication protocol, all forwarding ports, including a port to which a line interface for transmitting said incoming packet to the outside is connected, are determined by the line interface which has received said incoming packet, and

wherein when said incoming packet conforms to a second predetermined communication protocol, in said functional processor with said forwarding information generation function a port to which a line interface for transmitting said incoming packet to the outside is connected is determined as a forwarding port.

12. (currently amended) A packet communication device,
comprising:

a plurality of line interfaces capable of reception or transmission of a packet;

a plurality of functional processors capable of performing the same functional processing on an incoming packet received by any of said plurality of line interfaces;

a plurality of ports to which said plurality of line interfaces and said plurality of functional processors are connected;

a function item judgment unit for judging a function item to be required for said incoming packet; and

a forwarding information generator for determining a forwarding port of said incoming packet in response to said function item judged by said function item judgment unit, and imparting to said incoming packet forwarding information for designating said forwarding port,

wherein when the same address information is imparted to said incoming packet to be received successively by any of said plurality of line interfaces, a port to which the same functional processor is connected of said plurality of functional processors, is fixedly designated as said forwarding port;
and

a forwarding path switching unit for switching a forwarding path when forwarding among said plurality of ports based on said forwarding information,

when said function item judgment unit has judged that a plurality of functional processings are required for said incoming packet the plurality of forwarding information corresponding to functional processors capable of

executing said required functional processings is imparted to said incoming packet at the forwarding information generator in order to forward said incoming packet successively to a plurality of ports to which the functional processors capable of executing said required functional processings are connected respectively.

13. (previously presented) The packet communication device according to Claim 12, further comprising:

one or plural functional processors capable of functional processing different from said same functional processing,

wherein when it has been judged by said function item judgment unit that plural types of functional processing are necessary for said incoming packet, said forwarding information generator imparts, to said incoming packet, a plurality of forwarding information corresponding to a plurality of ports, to which plural types of functional processors corresponding to functional processing of said plural types are connected respectively.

14. (currently amended) The packet communication device according to Claim 13, wherein said function item judgment unit further comprises:

a function search unit for searching, based on address information imparted to said incoming packet, types of functional processing required by said incoming packet and a port to which a line interface for transmitting said incoming packet after the processing to the outside is connected;

a function item search unit for searching function items of functional processors connected to said plural ports and a connection number for each function item; and

a port search unit for searching function items of functional processors to be connected correspondingly to each of said plural ports.

15. (new) The packet communication device according to claim 3, wherein said functional judgment unit and said forwarding information generator are installed in at least one of said plurality of line interfaces.

16. (new) The packet communication device according to claim 4, wherein said functional judgment unit and said forwarding information generator are installed in at least one of said plurality of line interfaces.

17. (new) The packet communication device according to claim 5, wherein said functional judgment unit and said forwarding information generator are installed in at least one of said plurality of line interfaces.

18. (new) The packet communication device according to claim 6, wherein said functional judgment unit and said forwarding information generator are installed in at least one of said plurality of line interfaces.

19. (new) The packet communication device according to claim 3, wherein at least one said functional processor is further provided with said functional judgment processor and said forwarding information generator.

20. (new) The packet communication device according to claim 4, wherein at least one said functional processor is further provided with said functional judgment processor and said forwarding information generator.

21. (new) The packet communication device according to claim 5, wherein at least one said functional processor is further provided with said functional judgment processor and said forwarding information generator.

22. (new) The packet communication device according to claim 6, wherein at least one said functional processor is further provided with said functional judgment processor and said forwarding information generator.

23. The packet communication device according to claim 7, wherein at least one said functional processor is further provided with said functional judgment processor and said forwarding information generator.

REMARKS

The present Amendment amends claims 2, 7-10, 12 and 14 cancels claim 1, leaves claims 3-6, 11 and 13 unchanged and adds new claims 15-23. Therefore, the present application has pending claims 2-23.

Proposed Drawing Correction with respect to Fig. 2 is being submitted on even date herewith. Specifically, the wrong reference number “232” is listed in the “Layer 2 processor”. The correction reference number should be “22” as now corrected in the “Layer 2 processor”. Entry of the Proposed Drawing Correction is respectfully requested.

Claims 1-3 and 7-14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Krishnamurthi (U.S. Patent No. 7,164,698) in view of Paatela (U.S. Patent No. 6,944,168); and claims 4-6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Krishnamurthi in view of Paatela and further in view of Yoon (U.S. Patent No. 7,006,504). As indicated above, claim 1 was canceled. Therefore, the above 35 USC §103(a) rejection with respect to claim 1 is rendered moot. Accordingly, reconsideration and withdrawal of this rejection with respect to claim 1 is respectfully requested.

It should be noted that the cancellation of claim 1 was not intended nor should it be considered as an agreement on Applicants part that the features recited in claim 1 are taught or suggested by Krishnamurthi or Paatela whether taken individually or in combination with each other. The cancellation of claim 1 was simply intended to expedite prosecution of the present application.

The above 35 USC §103(a) rejections with respect to the remaining claims 2-14 is traversed for the following reasons. Applicants submit that the

features of the present invention as now recited in claims 2-14 are not taught or suggested by Krishnamurthi, Paatela and Yoon whether taken individually or in combination with each other as suggested by the Examiner. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw these rejections.

Amendments were made to the claims to more clearly describe features of the present invention as recited in the claims. Particularly, amendments were made to the claims to recite that the present invention is directed to packet communication device which is capable of easily performing required functions with respect incoming packets.

According to the present invention the packet communication device includes a plurality of line interfaces capable of reception or transmission of a packet, a plurality of ports to which the line interfaces are connected to which at least one functional processor to be used to perform functional processing on an incoming packet received by any of the line interfaces can be connected as needed, a function item judgment unit for judging a function item to be required for the incoming packet, a forwarding information generator for determining a forwarding port for the incoming packet in accordance with the function item obtained from judging by function item judgment unit and imparting to the incoming packet forwarding information for designating the forwarding packet and a forwarding pass switching unit for switching a forwarding path when forwarding the incoming packet among the ports based on the forwarding information.

Further, according to the present invention when the function item judgment unit has judged that a plurality of functional processings are

required for the incoming packet, the plurality of forwarding information corresponding to functional processors capable of executing the required functional processings is imparted to the incoming packet at the file forwarding information generator in order to forward the incoming packet successively to a plurality of ports to which the functional processors capable of executing the required functional processings are connected respectively. These features of the present invention are discussed, for example, in the present application beginning on page 12, line 19 through page 13, line 3.

The above described features of the present invention now more clearly recited in the claims enables flexible addition of functions by successively connecting the functional processors having different functions to the plurality of ports of the switch. In addition according to the present invention, in the line interface, there is provided a packet communication device capable of adding functions for making a setting easy when functions are added by imparting the plural forwarding information along with the incoming packet. Attention is directed to the description of the present application beginning on page 7, line 4 through page 8, line 7.

The above described features of the present invention are not taught or suggested by any of the references of record whether taken individually or in combination with each other. Particularly, the above described features of the present invention of are not taught or suggested by Krishnamurthi, Paatela or Yoon whether taken individually or in combination with each other as suggested by the Examiner.

Krishnamurthi discloses an example of a configuration of a line interface where the data from a high-speed input line is processed using low speed parallel processing.

However, Krishnamurthi does not teach or suggest module configurations which have different functions that are dedicated to functional processing as in the present invention. Moreover, Krishnamurthi does not teach or suggest a processing method for utilizing those modules (for example, method of transmitting data packets in a device) as in the present invention. Particularly, Krishnamurthi does not teach or suggest that when the function item judgment unit has judged that a plurality of functional processings are required for the incoming packet that the packet forward corresponding to the functional processors capable of executing the required functional processings is imparted to the incoming packet at the forwarding information generator in order to forward the incoming packets successively to the ports to which the functional processors capable of executing the required functional processings are connected respectively as in the present invention as recited in the claims.

Paatela discloses line interface processing for analyzing the contents of multi-protocol packets inputted to the line interface, for performing tagging for traffic processing for searching a destination of an output line and for quality of service. The processing is performed using only the line interface.

However, Paatela does not teach or suggest module configurations which have different functions that are dedicated to functional processing as in the present invention. Moreover, Paatela does not teach or suggest a processing method for utilizing those modules (for example, method of

transmitting data packets in a device) as in the present invention. Particularly, Paatela does not teach or suggest that when the function item judgment unit has judged that a plurality of functional processings are required for the incoming packet that the packet forward corresponding to the functional processors capable of executing the required functional processings is imparted to the incoming packet at the forwarding information generator in order to forward the incoming packets successively to the ports to which the functional processors capable of executing the required functional processings are connected respectively as in the present invention as recited in the claims.

Paatela discloses that searching the outputting line based on the destination address by analyzing the embedded header information of each protocol of the multiprotocol packets inputted to the line interface (column 21, lines 41-49) and outputting the tagged packets with the embedded header information of each protocol (column 22, lines 43-53).

However, the above described teachings of Paatela are not equivalent to the features of the present invention as recited in the claims. The features of the present invention are a structure in which the functional processors having different functions and are each connected to plural ports of the switch and in which the input packets are transferred to the plural ports successively based the requested functional processings as indicated in the incoming packet. The structure as taught by Paatela does not perform the flexible addition of functions as described above according to the present invention as recited in the claims.

Yoon discloses a method of establishing or terminating a virtual channel (VC) merging connection.

However, Yoon does not teach or suggest the concept of a packet transmission in a device for achieving functional processing as required by claims 4, 5 and 6 of the present application. More specifically, Yoon does not teach or suggest a configuration in which the used forwarding information (header information) is deleted every time the packets are transmitted in the device as in the present invention. Particularly, Yoon does not teach or suggest that when the function item judgment unit has judged that a plurality of functional processings are required for the incoming packet that the packet forward corresponding to the functional processors capable of executing the required functional processings is imparted to the incoming packet at the forwarding information generator in order to forward the incoming packets successively to the ports to which the functional processors capable of executing the required functional processings are connected respectively as in the present invention as recited in the claims.

Thus, each of Krishnamurthi, Paatela and Yoon fails to teach or suggest that when function item judgment unit has judged that a plurality of functional processings are required for the incoming packet, the plurality of forwarding information corresponding to functional processors capable of executing the required functional processings is imparted to the incoming at the forwarding information generator in order to forward the incoming packet successively to a plurality of ports to which the functional processors capable of executing the required functional processings are connected respectively as recited in the claims.

Therefore, since each of Krishnamurthi, Paatela and Yoon fails to teach or suggest the features of the present invention as now more clearly recited in the claims, combining these references in the manner suggested by the Examiner in the Office Action does not render obvious the claimed invention. Accordingly, reconsideration and withdrawal of the various rejections under 35 USC §103(a) is respectfully requested.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references utilized in the rejection of claims 1-14.

As indicated above, the present Amendment adds new claims 15-23. New claims 15-23 depend respectively from claims 7 and 8. Therefore, the same arguments presented above with respect to claims 7 and 8 apply as well to new claims 15-23.

In view of the foregoing amendments and remarks, Applicants submit that claims 2-23 are in condition for allowance. Accordingly, early allowance of the present application based on claims 2-23 is respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any

overpayment of fees, to the deposit account of MATTINGLY, STANGER,
MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417
(1213.43382X00).

Respectfully submitted,

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